Installation Checklist – HP ProLiant Cluster F500 for MA8000/EMA12000/EMA16000 Enhanced using Microsoft Windows 2000 Advanced Server

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ProLiant Cluster F500 for the StorageWorks MA8000/EMA12000/EMA16000 Enhanced

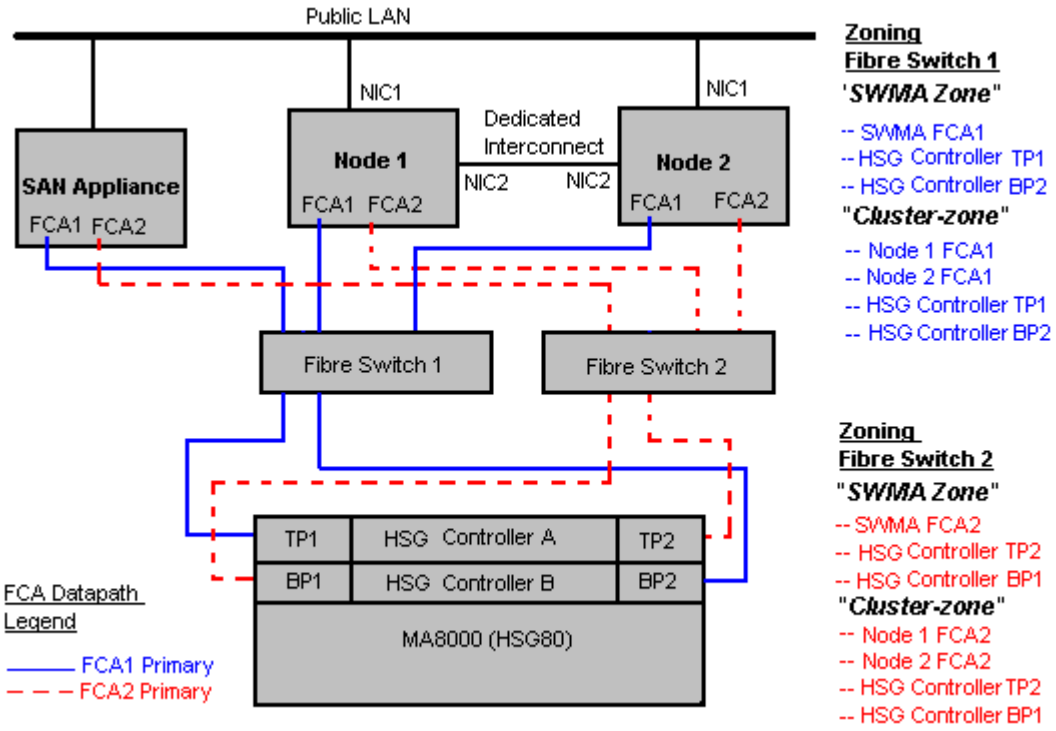
The ProLiant Cluster F500 for the StorageWorks MA8000/EMA12000/EMA16000 is a cluster solution made up of a ProLiant Cluster F500 for the Enterprise SAN Cluster Kit, high end or high density ProLiant servers, StorageWorks MA8000/EMA12000/EMA16000 storage systems, and a Microsoft Windows cluster capable operating system. The HP ProLiant Cluster F500 for the StorageWorks MA8000/EMA12000/EMA16000 is a high-end cluster for mission critical data.

Key features of the ProLiant Cluster F500 for the MA8000/EMA12000/EMA16000 include:

- Scalable SANs designed to maximize cluster performance, uptime and storage capacity
- Multi-path software allows maximum availability with no single point of failure
- Disaster tolerant solutions to protect mission critical applications across geographies
- Unified suite of HP cluster management tools offer management capabilities to simplify the installation of complex clustered SAN configurations
- Supported in a shared fabric environment

Hardware Cabling and Zoning Scheme

Figure 1. Hardware cabling and zoning scheme



Software and Hardware Requirements

The following table provides a checklist of the required software versions and, if applicable, any items to execute before beginning the installation. Place a checkmark **(✓)** in the box after completing each step.

✓	Software and Hardware Requirements
☐	Before installing your HP ProLiant F500 for MA8000/EMA12000/EMA16000 cluster solution, it is very important to refer to the HP Cluster Configuration Support website for details on components that make up a valid cluster configuration. There is a support matrix for each HP Cluster that details components that represent quality tested and supported HP Cluster configurations. Using the link below, select the appropriate operating system and storage platform and then refer to the row of deliverables that are relevant to the configuration you require. The HP Cluster Configuration Support website can be found at http:/h18022.www1.hp.com/solutions/enterprise/highavailability/answercenter/configuration-all.html
☐	SmartStart CD.
☐	Two supported ProLiant Servers, two supported Host Bus Adapters (HBAs) per server, two or more supported network adapters per server, two supported Fibre Channel switches, and one or more StorageWorks MA8000/EMA12000/EMA16000s per cluster. The storage will be referred to as the MA8000 for the remaining steps.
☐	Review and understand any Read This First (RTF) and Getting Started cards that were shipped with the product.
☐	Microsoft Windows 2000 Advanced Server software and documentation.

☐	Applicable Microsoft Windows 2000 Advanced Server Service Pack.
☐	HP Insight Manager (optional).
☐	One HP OpenView Storage Management Appliance.
☐	HP StorageWorks HSG Element Manager software.
☐	HP StorageWorks Solution Software for Windows for HBA driver.
☐	HP StorageWorks MA8000 Array Controller Software (ACS) firmware.
☐	HBA firmware and boot bios.
☐	Fibre Channel switch firmware.
☐	HP StorageWorks Secure Path for Windows (Included in the ProLiant Cluster F500 for the Enterprise SAN Cluster Kit).
☐	Sufficient software rights to install the operating system and software applications on each node.
☐	Ensure all hardware is installed and properly cabled as shown in **figure 1**- hardware cabling and zoning scheme diagram on page 3.
☐	Install the NICs for the private network (cluster heartbeat interconnect) and the public network in each cluster node.
☐	Install the HBAs in each cluster node. **Best Practice:** If the server is equipped with multiple buses, it is recommended to install each HBA on a different bus.
☐	Cable the private NIC in each cluster node. You may use the Ethernet Crossover cable included in your cluster kit if desired.
☐	Cable the HBAs to the switches in each cluster node. **Note:** The configuration steps detailed in this document are for a switched environment only.
☐	Cable the MA8000 storage subsystem(s) to the switches.
☐	Cable the LAN using an Ethernet cable from the public NIC in each cluster node to the public LAN switch.

Gathering Information

The following table provides a checklist of the required input parameters that will facilitate the operating system and cluster installation. Write the information in the values column next to each item. Place a checkmark **(✓)** in the box after filling in each value.

✓	Item	Values	
☐	Name for each node:	Node 1:	Node 2:
☐	Public network connection IP address and subnet mask for each node:	Node 1	Node 2
		IP address: Subnet mask:	IP address: Subnet mask:
☐	Private network connection (cluster heartbeat) IP address and subnet mask for each node:	Node 1	Node 2
		IP address: Subnet mask:	IP address: Subnet mask:

☐	WWID, slot number, and bus of each HBA for each node:	Node 1	Node 2
		HBA 1 WWID: HBA 1 slot and bus: HBA 2 WWID: HBA 2 slot and bus:	HBA 1 WWID: HBA 1 slot and bus: HBA 2 WWID: HBA 2 slot and bus:
☐	Cluster name:		
☐	Cluster IP address and subnet mask:	IP address: Subnet mask:	
☐	Default gateway address:	IP address:	
☐	WINS server address:	IP address:	
☐	DNS address:	IP address:	
☐	Local machine Administrator password (used during OS installation):	Know the Administrator password	
☐	Domain name:		
☐	Domain administrator user name and password (used during OS installation to have the machine join the domain):	Know the user name and password	
☐	Domain account name and password for cluster service (this account has special privileges on each cluster node):	Know the user name and password	

Configuring Storage - Initial Steps

The following table provides a checklist of the steps for the initial steps of the storage configuration. Place a checkmark **(✓)** in the box after completing each step.

✓	**Configuring Storage - Initial Steps**
☐	Connect the MA8000 to the Fibre Channel switches. Refer to **figure 1** - hardware cabling and zoning scheme diagram on page 3. For more information regarding the F500, please visit http://h18000.www1.hp.com/solutions/enterprise/highavailability/microsoft/haf500/index-ma8000.html
☐	Power on the MA8000 subsystem.
☐	Connect the serial cable that was provided with the HSG80 controller to a monitor node or server, which will be used to initially configure the MA8000. Refer to the HSG80 documentation regarding establishing a hyperterminal connection to the storage subsystem.
☐	Before the HSG80 controllers can be configured, the node ID and check sum must be set. This information can be found on the controller enclosure. **Example**: set this node_id=5000-1fe1-0007-1350 7k
☐	The controller must then be rebooted. **Example**: restart this
☐	Because the controllers will be in an Active/Active configuration, the controllers need to be placed in a multibus failover configuration. **Example**: set multibus_failover copy = this
☐	Set the correct date and time on the controllers. **Example**: set this time=dd-mmm-yyyy:hh:mm:ss **Example**: set this time=18-feb-2003:18:50:00
☐	If you are using cache batteries instead of a global UPS, then you will need to run the frutil utility on each controller to set

	the correct battery expiration date. **Example**: run frutil (Select yes to replace battery, and then press enter when prompted). You will have to manually move the serial cable to the other controller.
☐	Configure the controllers to use mirrored cache. **Example**: set this mirrored_cache
☐	In order to setup logical drives, the storage subsystem needs to identify how many disks are present by running the config utility. **Example**: run Config
☐	All four fibre ports on the HSG80 controllers need to be turned on for the HP OpenView Storage Management Appliance to see the storage subsystem. **Note:** This example assumes the HSG80 is attached to fabric switches. **Example**: set this port_1_topology=fabric set this port_2_topology=fabric set other port_1_topology=fabric set other port_2_topology=fabric

Configuring the HP OpenView Storage Management Appliance

The following table provides a checklist of the configuration steps for the HP OpenView Storage Management Appliance. Place a checkmark **(✓)** in the box after completing each step.

✓	**Configuring the HP OpenView Storage Management Appliance**
☐	Power on the HP OpenView Storage Management Appliance.
☐	For detailed installation and configuration instructions, refer to the HP OpenView Storage Management Appliance documentation. http://h18000.www1.hp.com/products/sanworks/managementappliance/documentation.html
☐	Log into the Storage Management Appliance from any network browser. **Note:** The default username and password is **administrator**.
☐	Install the HP StorageWorks HSG Element Manager Software if needed: Insert the HP StorageWorks HSG Element Manager CD → Select **Application → Installation Services→Install Products.** Select **CDROM → Next Step** and follow the on-screen instructions to continue.
☐	Cable the Storage Management Appliance to the SAN. Refer to **figure 1**- hardware cabling and zoning scheme diagram on page 3 for more details.
☐	Connect the Storage Management Appliance to the ethernet network. **Note:** You must have a working network to configure the storage subsystem via the Storage Management Appliance.
☐	Configure the zone for the Storage Management Appliance. Using telnet or the Fibre Channel switch graphical user interface (GUI), create a Fibre Channel zone that consists of the WWIDs of the HBAs in the Storage Management Appliance and the WWIDs of the HSG80 controller ports. For more information regarding zoning, please refer to the Zoning User's Guide located at http://h18004.www1.hp.com/solutions/enterprise/highavailability/whitepapers/ms-ma8000.html
☐	Reboot the Storage Management Appliance. After creating the Storage Management Appliance zone, the appliance may take a long time to identify the new connections of the HSG80. To speed up the configuration process, you can reboot the Storage Management Appliance to force the discovery of the HSG80 connections and ports.

Installing Node 1 Operating System

The following table provides a checklist of the operating system installation steps for Node 1. Place a checkmark **(✓)** in the box after completing each step.

✓	Installing Node 1 Operating System
☐	Power on Node 1.
☐	After the Array Controller initializes, press the **F8** key to enter the Option ROM Configuration for Arrays (ORCA).
☐	Create a primary boot partition on the server.
☐	Exit the ORCA utility.
☐	Boot the server with the SmartStart CD in the CD-ROM drive. **Note:** The instructions below are for SmartStart 6.x or later. Please refer to SmartStart 5.50 documentation for pre-Generation 2 servers.
☐	Select the desired language from the Select Language screen.
☐	Follow the SmartStart on-screen instructions. Insert the operating system CD when prompted to complete the installation process.
☐	Each cluster node requires at least two network adapters—one connected to a public network, and one connected to a private network. *For the public network connection:* If the network adapter can transmit at multiple speeds, then manually specify a speed and duplex mode. The speed for the network adapter should be hard coded (manually set) to be the same on all nodes according to the card manufacturer's specification. **Best Practice:** To provide a maximum level of redundancy, use NIC Teaming capabilities for selected HP network products to provide a redundant public network connection. Please note, however, that NIC Teaming is not supported for the private network connection.
☐	Configure the TCP/IP settings for the public network connection.
☐	*For the private network connection:* To eliminate possible private network cluster communication issues refer to Microsoft Knowledge Base (KB) article **258750** to properly setup the private network. http://support.microsoft.com/default.aspx?scid=kb;en-us;258750
☐	Configure the TCP/IP settings for the private network connection.
☐	Install the applicable Microsoft Windows 2000 Advanced Server Service Pack.
☐	Join the Microsoft Windows 2000 Domain and reboot when prompted.
☐	After the reboot, log the machine into the domain.
☐	Install the HBA device drivers. Insert the StorageWorks Solution Software for Windows NT/2000/2003 Kit CD into the server CD-ROM drive. If autorun is enabled, the installation program starts. Otherwise, navigate to the root of the CD and double-click install.bat. Click **Solution Software for Windows.** Click **Perform Multi Driver Update** to start the driver update utility. **Note:** When the driver update utility installation finishes, **DO NOT** reboot. After the HBA driver update completes, the StorageWorks Solution Software for Windows NT/2000/2003 Kit will automatically present you with the ability to install the Fibre Channel software.
☐	Install the Fibre Channel software. Select **Setup Fibre Channel Software** to start the Fibre Channel setup wizard. If more than 5 Windows servers will have exclusive access to the same HSG80, the **Extended Configuration** option should be selected.
☐	Reboot after the installation of the Fibre Channel software.

☐	Install HP StorageWorks Secure Path for Windows software. Insert the HP StorageWorks Secure Path for Windows CD into the server CD-ROM drive. Select **Install secure path** and follow the on-screen instructions. **Note:** Verify that reverse lookup is configured correctly on the Domain Name System (DNS) server if you are using Fully Qualified Domain Names (FQDN).
☐	Reboot Node 1.
☐	Configure the cluster zone for Node 1. Using telnet or the Fibre Channel switch graphical user interfaces (GUI), configure the cluster zone. The cluster zone will consist of the WWIDs of the HBA in Node 1 and the WWIDs of the HSG controller ports. For more information regarding zoning, please refer to the Zoning User's Guide located at http://h18004.www1.hp.com/solutions/enterprise/highavailability/whitepapers/ms-ma8000.html **Note:** After installing the HBA driver and Fibre Channel software, the HBA will register its WWID with the fabric switch. There should be a minimum of two zones created per fabric. One of the zones consists of the Storage Management Appliance and the HSG controller ports, and the other zone consists of the cluster nodes and the HSG controller ports.
☐	When the installation is complete, shutdown Node 1.

Installing Node 2 Operating System

The following table provides a checklist of the operating system installation steps for Node 2. Place a checkmark **(✓)** in the box after completing each step.

✓	**Installing Node 2 Operating System**
☐	Power on Node 2.
☐	After the Array Controller initializes, press the **F8** key to enter the Option ROM Configuration for Arrays (ORCA).
☐	Create a primary boot partition on the server.
☐	Exit the ORCA utility.
☐	Boot the server with the SmartStart CD in the CD-ROM drive. **Note:** The instructions below are for SmartStart 6.x or later. Please refer to SmartStart 5.50 documentation for pre-Generation 2 servers.
☐	Select the desired language from the Select Language screen.
☐	Follow the SmartStart on-screen instructions. Insert the operating system CD when prompted to complete the installation process.
☐	Each cluster node requires at least two network adapters—one connected to a public network, and one connected to a private network. *For the public network connection*: If the network adapter can transmit at multiple speeds, then manually specify a speed and duplex mode. The speed for the network adapter should be hard set (manually set) to be the same on all nodes according to the card manufacturer's specification. **Best Practice:** To provide a maximum level of redundancy, use NIC Teaming capabilities for selected HP network products to provide a redundant public network connection. Please note, however, that NIC Teaming is not supported for the private network connection.
☐	Configure the TCP/IP settings for the public network connection.
☐	*For the private network connection*: To eliminate possible private network cluster communication issues, refer to Microsoft Knowledge Base (KB) article **258750** to properly setup the private network. http://support.microsoft.com/default.aspx?scid=kb;en-us;258750
☐	Configure the TCP/IP settings for the private network connection.
☐	Install applicable Microsoft Windows 2000 Advanced Server Service Pack.
☐	Join the Windows 2000 Domain and reboot when prompted.
☐	After the reboot, log the machine into the domain.

☐	Install the HBA device drivers. Insert the StorageWorks Solution Software for Windows NT/2000/2003 Kit CD into the server CD-ROM drive. If autorun is enabled, the installation program starts. Otherwise, navigate to the root of the CD and double-click install.bat. Click **Solution Software for Windows.** Click **Perform Multi Driver Update** to start the driver update utility. **Note:** When the driver update utility installation finishes, **DO NOT** reboot. After the HBA driver update completes, the StorageWorks Solution Software for Windows NT/2000/2003 Kit will automatically present you with the ability to install the Fibre Channel software.
☐	Install the Fibre Channel software. Select **Fibre Channel Software Setup** to start the Fibre Channel setup wizard. If more than 5 Windows servers will have exclusive access to the same HSG80 the **Extended Configuration** option should be selected.
☐	Reboot after the installation of the Fibre Channel software.
☐	Install HP StorageWorks Secure Path for Windows software. Insert the HP StorageWorks Secure Path for Windows CD into the server CD-ROM drive. Select **Install secure path** and follow the on-screen instructions. **Note:** Verify that reverse lookup is configured correctly on the Domain Name System (DNS) server if you are using Fully Qualified Domain Names (FQDN).
☐	Reboot Node 2.
☐	Configure the cluster zone for Node 2. Using telnet or the Fibre Channel switch graphical user interfaces (GUI) configure the cluster zone. The cluster zone will consist of the WWID of the HBAs in Node 2 and the WWIDs of the HSG controller ports. For more detail information regarding zoning please refer to the Zoning User's Guide located at http://h18004.www1.hp.com/solutions/enterprise/highavailability/whitepapers/ms-ma8000.html **Note:** After installing the HBA driver and Fibre Channel software, the HBA will register its WWID with the fabric switch. There should be a minimum of two zones created per fabric. One of the zones will consist of the StorageWorks SAN Management Appliance and the HSG controller ports, and the other zone will consist of the cluster nodes and the HSG controller ports.
☐	When the installation is complete, shutdown Node 2.

Configuring the Shared Storage

The following table provides a checklist of the steps necessary to configure the MA8000 shared storage. Place a checkmark **(✓)** in the box after completing each step.

✓	**Configuring the Shared Storage**
☐	Power on both nodes. Log into the network domain.
☐	Verify the HBAs have the most current supported firmware. Verify the HBAs firmware by accessing the lputilnt utility. However, do not make any driver parameter changes using this utility. Select **Start → run → \winnt\system32\lputilnt**
☐	Log into the Storage Management Appliance.
☐	Launch the HP StorageWorks HSG Element Manager. Select **Devices → HSG Element Manager**
☐	Discover the storage system. If this is the first time the Storage Management Appliance sees the HSG80 controllers, the appliance needs to be granted access to the controllers. Select **Options** and then select **Enable** on the pair of controllers that the appliance will manage. The storage subsystem may take a few minutes to be fully discovered by the Storage Management Appliance

☐	Identify the connections. After the Storage Management Appliance has fully discovered the storage subsystem, select the **controller** by expanding the tree view then select **hosts.** There should be a minimum of 12 connections present if the two zones were configured correctly on the fabric switches. There should be a total of 8 connections created by the two cluster nodes and 4 connections created by the Storage Management Appliance. If the Storage Management Appliance does not see the correct number of connections, you may have to reboot your nodes or Storage Management Appliance again. **Note:** It is a good idea to rename the connections to something more meaningful for ease of troubleshooting. Refer to the MA8000 reference documentation for instructions on renaming your connections. http://h18006.www1.hp.com/products/storageworks/ma8kema12k/index.html
☐	Create and Present the Virtual Disks. Select **Virtual Disks.** Click **Create Virtual Disks.** Select the type of redundancy requirements for the new virtual disk. Select from the list of available physical disks. If a preferred controller is required, you can specify a preferred path **This Controller** or **Other Controller.** Present the Virtual Disks to all nodes of the cluster. Select the connections that belong to the cluster nodes. There should be 8 connections selected for a two-node cluster. Repeat these steps for creating the remaining virtual disks that are required. **Note:** When presenting your virtual disks to the cluster nodes, do not select the connections that belong to the Storage Management Appliance.
☐	Configure the Virtual Disks on Node 1. Power down Node 2. From the desktop of Node 1, select **Start → Programs → Administrative Tools → Computer Management**. Then select **Disk Management** to create volumes out of the logical drives. **Note:** It is recommended that you configure the virtual disks on one node only. Do not upgrade the logical drives from Basic to Dynamic. Microsoft Cluster Services does not support dynamic disks.
☐	Be sure to assign drive letters and format the volumes as NTFS partitions. It is a good practice to provide a volume label to help identify the drives when the second node is powered on to discover the drives. This method makes it easier to scan the drives and ensure the correct drive letter is present.
☐	Close **Disk Management**.

Installing the Cluster

The following table provides a checklist of the cluster installation steps. Place a checkmark **(✓)** in the box after completing each step.

✓	**Installing the Cluster**
☐	Power on Node 1. Log into the network domain.
☐	Install the Microsoft Cluster Services (MSCS) component of Microsoft Windows 2000 Advanced Server on Node 1. Refer to the Microsoft Windows 2000 Advanced Server documentation for details on installing MSCS.
☐	Install applicable Microsoft Windows 2000 Advanced Server Service Pack and reboot Node 1 when prompted.
☐	Rerun the ProLiant Support Pack for Microsoft Windows 2000 to ensure that the latest HP drivers were not overwritten by the Service Pack installation. Reboot Node 1 if prompted.
☐	Power on Node 2. Log into the network domain.
☐	Install and configure the Microsoft Cluster Services (MSCS) component of Microsoft Windows 2000 Advanced Server. Join an existing cluster on Node 2. Refer to the Microsoft Windows 2000 Advanced Server documentation for details on installing MSCS.
☐	Install applicable Microsoft Windows 2000 Advanced Server Service Pack and reboot Node 2 when prompted.
☐	Rerun the ProLiant Support Pack for Microsoft Windows 2000 to ensure that the latest HP drivers were not overwritten by the Service Pack installation. Reboot Node 2 if prompted.

Validating the Cluster Configuration

To validate the cluster installation, perform the following steps from either cluster node. Place a checkmark **(✓)** in the box after completing each step.

✓	**Validating the Cluster Configuration**
☐	From the desktop of either node: Select **Start → Programs → Administrative Tools → Cluster Administrator**, and connect to the cluster.
☐	Right click on one of the cluster groups and select **Move Group**.
☐	Verify the group fails over and all resources come online.
☐	Right click on the same cluster group and select **Move Group**.
☐	Verify that the group fails back to the original node and all resources come online.
☐	Repeat the **validating the cluster configuration** steps, for each group.

The installation is now complete.

For more Information

To learn more about HP High Availability and ProLiant Clusters visit the following Web site: http://www.hp.com/servers/proliant/highavailability.

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